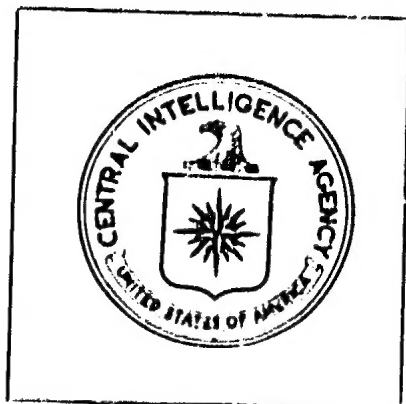


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The Tan-Sam Railroad—Approach Full Oper Status

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THE TAN-ZAM RAILROAD -- APPROACHING FULL
OPERATIONAL STATUS

SUMMARY AND CONCLUSIONS

1. Track laying for the Tan-Zam Railroad was completed on 7 June 1975, when the line was extended to the Zambian terminus of Kapiri Mposhi. Test bed operations over the entire length of the system have begun, and the railroad should be fully operational early in 1976.

2. The Tan-Zam Railroad provides a link from the Zairian-Zambian copper belt to the African east coast port of Dar es Salaam. At full capacity, the rail line will provide an enormous increment to the existing transport networks in each country. It will meet land-locked Zambia's objective to move its foreign trade by rail to both the Atlantic and Indian Oceans without traversing Rhodesia. Monumental construction and financial problems in the construction of the railroad having been overcome with Chinese assistance, access to low cost reliable transport may yet be delayed because of Tanzanian failure to expand the Indian Ocean terminus at Dar es Salaam.

3. Peking financed the project with a \$402 million interest-free credit after the industrial countries refused to underwrite the project, pronouncing it uneconomic and wasteful. Chinese technicians designed and built the railroad. The largest Chinese construction project in the Third World, the Tan-Zam Railroad has been a symbol of Peking's interest in African development.

4. During construction, the Tan-Zam Railroad contributed an estimated \$175 million to Tanzania's GDP and \$115 million to Zambia's.

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The anticipated traffic will provide the funds to operate the railroad and to generate the income needed to service the debt when payments begin in 1983.

5. Zambia has a choice of several alternative rail, highway, and combined rail-highway routes for copper exports and bulk imports, which might become competitive to the Tan-Zam Railroad -- but only if security can be restored in Angola and a political settlement is reached in Rhodesia. Zambia's decision to use these alternative routes will hinge on rail charges, port charges, and the quality of service at the major ports. Meanwhile, Zambia will not be able to divert much traffic from the closed Angolan route to the Tan-Zam Railroad, because the current port congestion in Dar es Salaam is likely to persist at least through mid-1976.

DISCUSSION

Background¹

6. The decision by Tanzania and Zambia to construct the Tan-Zam Railroad was based on economic imperatives that were intensified by Zambia's deteriorating political relations with Rhodesia. Tanzania viewed the system as a means to speed development of its mineral and agricultural resources along the route of the new line and to stimulate trade with Zambia. For Zambia, the railroad offered a secure route for the transport of copper, its major export and hard currency earner. Historically, landlocked Zambia relied heavily on neighboring Rhodesia for access to seaports in South Africa and Mozambique. In the wake of Rhodesia's Unilateral Declaration of Independence (UDI) from the British in 1965, Zambia attempted to reduce its trade through Rhodesia but with little success. In 1972, approximately 50% of that trade still transited Rhodesia. The constant threat of route closure materialized in 1973, when

1. For additional details, see ER IM 70-162, The Tan-Zam Railroad, Progress and Prospects, November 1970, Secret No Foreign Dissem.

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Rhodesia closed the border for one month. Since then, Zambia has redirected its trade, with only a fraction transiting Rhodesia. Major shifts were to the Benguela Railroad and the Tan-Zam Highway (see Table 1). The potential importance of the Tan-Zam Railroad was further underlined in August, when service on the Benguela Railroad was suspended because of damage to the line from fighting in Angola.

Table 1

Estimated Zambian Traffic to the Sea¹

	Thousand Metric Tons		
	1972 ²	1973	1974
Total	1,200	1,100	1,050
Rail via Rhodesia	590	Negl.	Negl.
Benguela Railroad through Angola to Lobito	215	570	525
Tan-Zam Highway	305	360	370
Others	90	170	155

1. Exports and imports.
2. Prior to border closure.

7. Tanzania and Zambia sought Western financing for the railroad in 1964 with no success. They were equally unsuccessful and unable to interest the USSR in the project. So Tanzania and Zambia turned to China, which agreed in principle on 5 September 1967 to construct and finance the railroad. The credit agreement was signed on 12 July 1970, after surveys and plans had been completed by Chinese technicians. Under the accord, China extended a \$402 million interest-free credit for construction of the railroad and for the purchase of locomotives and rolling stock. A long-term loan covered the cost of equipment and commodities to be sold on the Tanzanian and Zambian markets to finance the local construction costs.²

2. For example, workers' wages, acquisition of land for the rail line, housing, and the procurement of materials on the domestic market.

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8. Tanzania and Zambia are assessed equally for the loan. Credit repayments begin in 1983 in 30 annual installments. The currency conversion rate in repaying the loan will be the average of the buying and selling rates of the national currencies determined by the Bank of China.

The Railroad

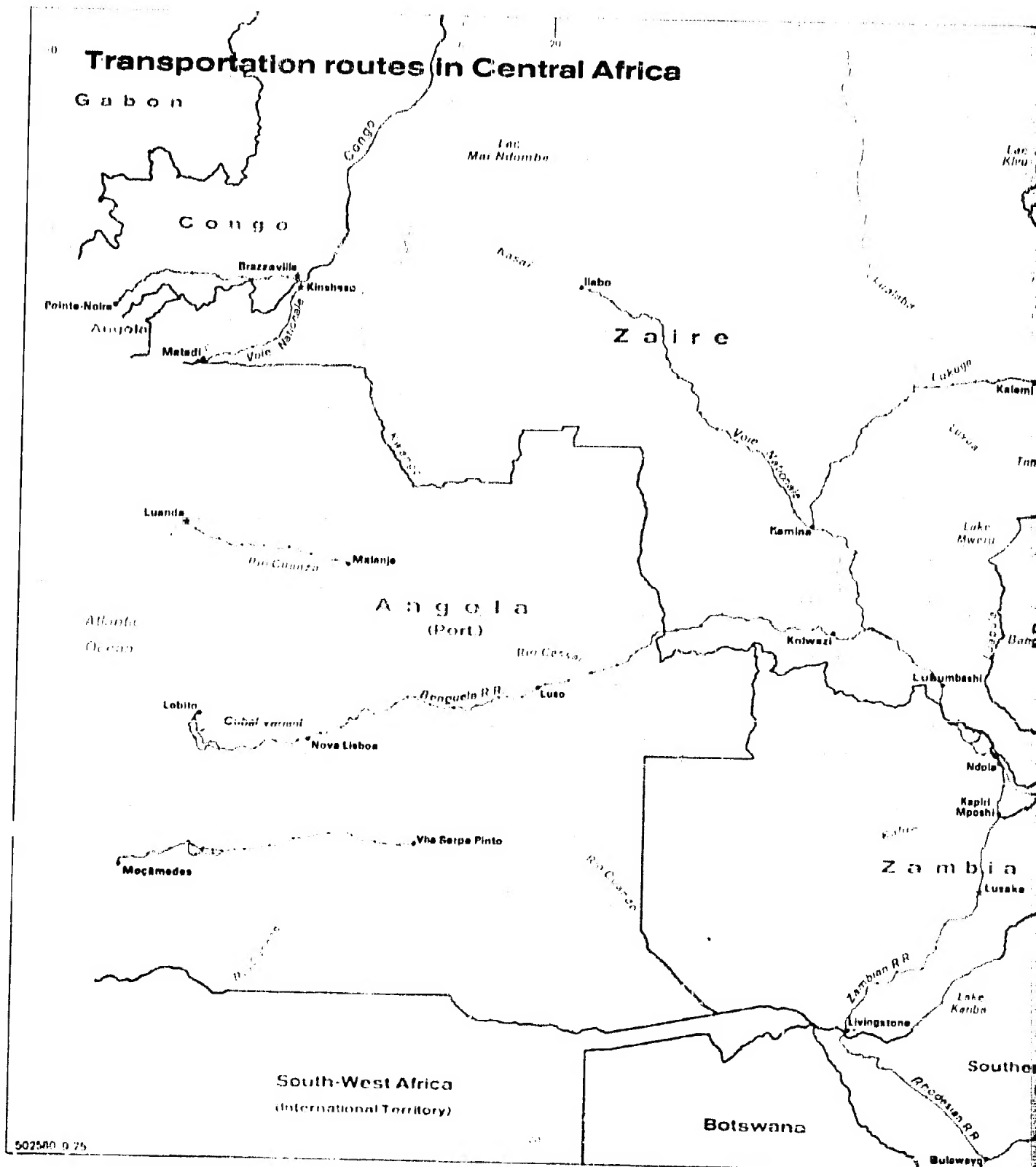
9. The Tan-Zam Railroad consists of a single-track (3 feet, 6 inches gauge) rail route extending some 1,150 miles from the port of Dar es Salaam in Tanzania to Kapiri Mposhi in Zambia. The gauge is compatible with Zambia's system but not with East Africa's smaller gauge. Nevertheless, it will join the rail systems of the two countries and provide a second transcontinental rail route (see Figure 1). Traffic is facilitated by several multi-track local sidings.³ The road's initial annual capacity will be 1 million tons each way (the equivalent of about 2 or 3 full trains each way per day), gradually increasing to 3.5 million tons in each direction by 1978.

10. The Chinese have designed and built a quality rail system, aimed at low cost maintenance and minimal delay to service. A high degree of engineering skill is evident in the large number of bridges, culverts, and tunnels, and the track-laying operation was exemplary. Washouts caused by steep slopes have been minimized by plantings and intensive maintenance. The Chinese are the only nation in the world engaged in a large-scale external railway construction program in the past two decades.

11. The railroad will be formally handed over to the governments of Tanzania and Zambia after a six-month trial period to follow the inauguration of through service late this year. Operation of the railroad will be administered by the Tan-Zam Railway Authority (TAZARA), a corporation that reports to an Inter-Governmental Ministerial Committee whose members are appointed by the presidents of the two governments.

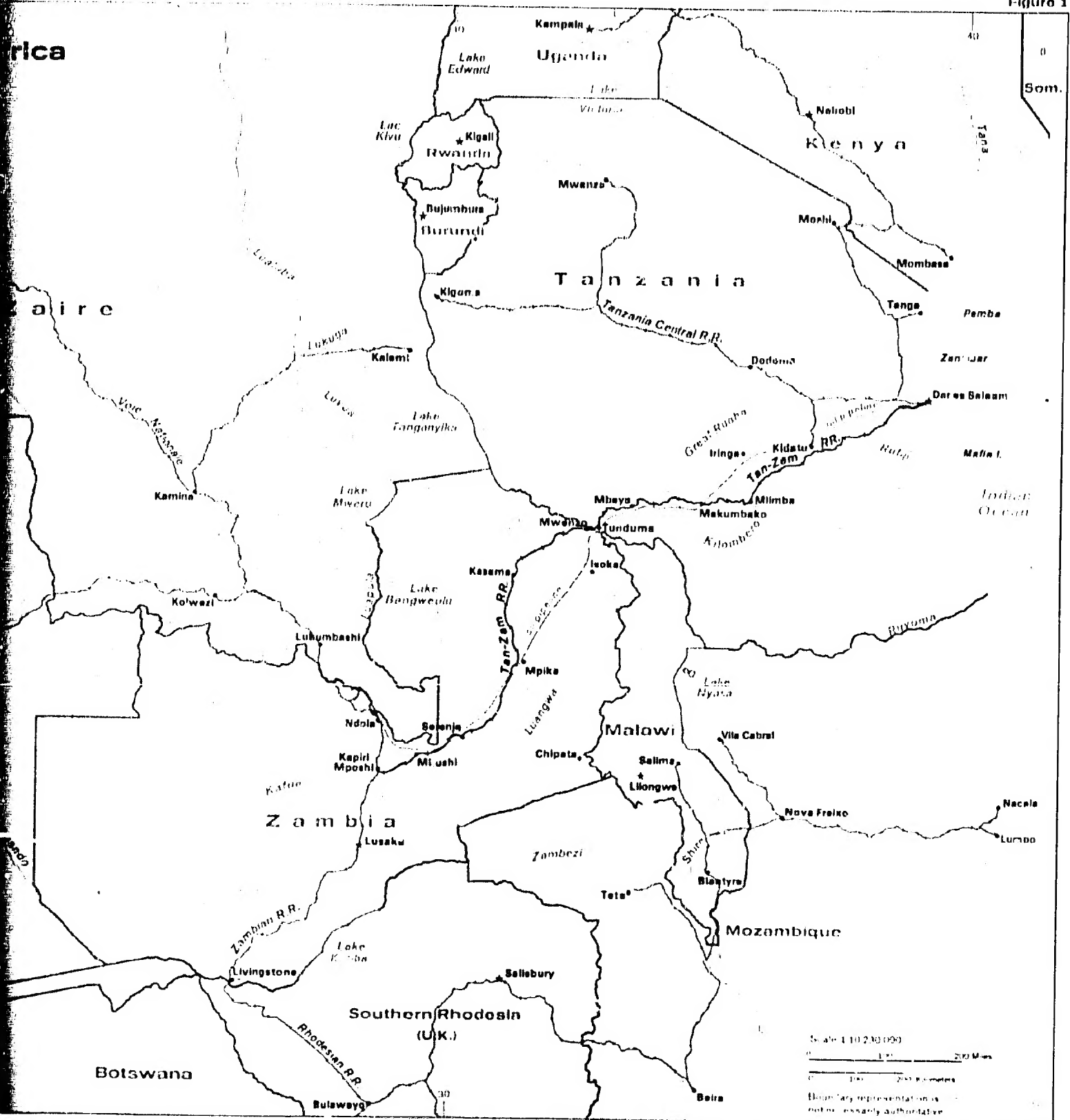
³. For specifications and installations, see Table 2.

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Figure 1



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Table 2

Tan-Zam Railroad: Specifications and Installations

Specifications	
Length	1,150 miles: 600 miles in Tanzania; 550 miles in Zambia (approximately)
Gauge	3 feet, 6 inches
Track	Single track with sidings, 45 kilograms per meter rail.
Ties	Monobloc prestressed concrete.
Capacity	Initial: one million metric tons each way per year. Eventual: three and one-half million tons each way per year.
Equipment	102 diesel-hydraulic, 2,000-horsepower locomotives; 2,100 freight cars (including open cars); 100 passenger coaches.
Installations	
Freight classification	Yombo (on outskirts of Dar es Salaam) 10-track yard.
Train stations	147 planned, 91 to be completed by the time the railroad becomes operational. Multi-track sidings are located at most stations.
Repair workshops	Dar es Salaam - completed Mpika - completed Mbeya - completed Kasama - to be constructed Nakonde - to be constructed Kapiri Mposhi - to be constructed
Railroad tie factory	Mang'ula. Manufactures prefabricated concrete ties and concrete telegraph poles. Probably will be converted to a prefabricated concrete plant.
Ancillary works	11 electric powerplants 17 water stations 12-channel communication network

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Table 2

**Tan-Zam Railroad: Specifications and Installations
(Continued)**

Training facilities	
Railroad management and maintenance	Dar es Salaam (also Peking and Mpika)
Signaling and communications	Railway Technical School, Mang'ula
Engineering trades	Location unknown. Training machinists and diesel, passenger car, and freight car fitters.

Tanzania and Zambia are equally represented on the Authority's Board of Directors. Operating expenses are to be shared equally by the two countries.

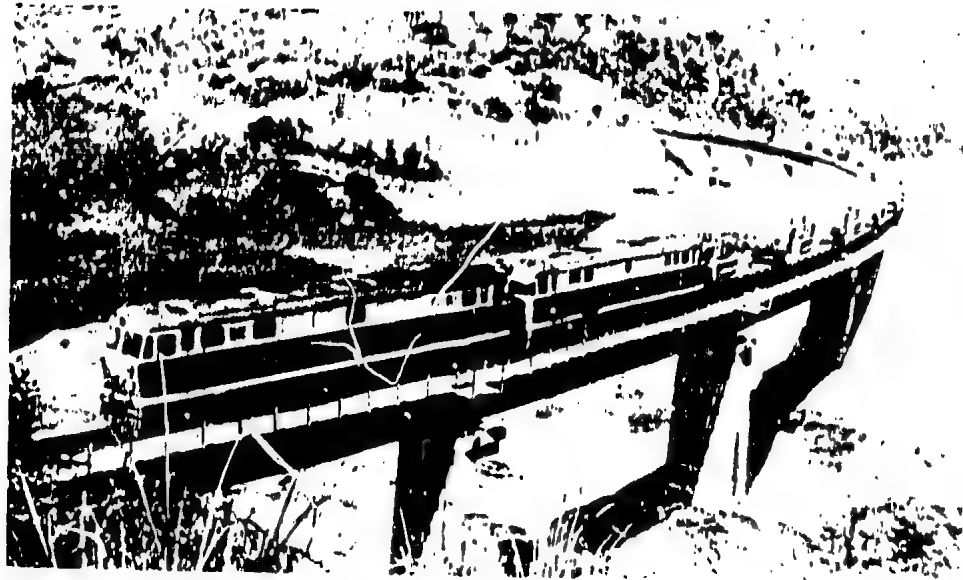
12. The Authority, established in 1968 to coordinate planning and construction work on the railroad, appears to have functioned efficiently during the construction period, probably because China maintained firm control over disbursements. An estimated 300 Chinese personnel are expected to remain to provide technical and training services to the Authority at least until 1978. India also has offered technical assistance in conjunction with a contract to provide rolling stock. We estimate that a permanent work force of 5,000 will be required to operate and maintain the line, divided about equally between Tanzania and Zambia.

Construction in Tanzania and Zambia

13. Construction began late in 1970. Work went on simultaneously in each country. Track-laying began in Tanzania, and proceeded from Dar es Salaam, its eastern terminus, toward Kapiri Mposhi. Track mileage in each country is approximately the same. The Tanzanian segment took 3 years to build, compared with 2 years for the Zambian portion, because of the more difficult terrain and surface water problems in Tanzania. Swamps,

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Bridges on the Mlimba-Makumbako section to the Tan-Zam Railroad.

mountains cut by deep valleys, eroded and unstable soils, and rock escarpments on a single stretch of 90 miles from Mlimba to Makumbako required numerous tunnels and bridges, accounting for more than 30% of the structures on the 1,150-mile right of way. By December 1972, track extended 408 miles to Makumbako. In August 1973, ceremonies were held

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at Tunduma on the Zambian border marking completion of track-laying on the Tanzanian portion of the rail line.

14. Chinese construction crews were then shifted to Zambia, where only a portion of the 120-mile Kasama-Mpika stretch had been laid. Operations in August 1973 concentrated on laying track west of the Tanzanian-Zambian border. By April 1974 a train service was inaugurated at Mwenzo, 11 miles inside the Zambian border, marking the beginning of freight service on the Tan-Zam Railroad between Dar es Salaam and Zambia. President Kaunda announced that track-laying to the Zambian terminus of Kapiri Mposhi had been completed on 7 June 1975.



Makumbako section of the Tan-Zam Railroad

The Traffic Picture

15. At the time full passenger and freight service is established, the line should accommodate approximately 50% of Zambia's total transport requirements, including three-fourths of its copper exports and two-thirds of Tanzania's transport requirements. At full capacity (7 million tons), the Tan-Zam Railroad should be able to meet all Zambian and Tanzanian transport requirements, including 1 million tons of Zambian and Zairian copper exported annually.

16. Two trains per month have been operating between Dar es Salaam and Mwenzo, Zambia, since April of last year. These trains usually carry only 1,200 tons of freight from Dar es Salaam to Mwenzo and return nearly empty. Nonscheduled trains supplement regular freight service,

however. They boosted total traffic in the first six weeks of operations to 7,000 tons. Passenger service and Zambian copper shipments will rapidly swell this total now that the entire system is completed.

17. Several factors will control the speed with which the line will expand freight service:

- Congestion at the port of Dar es Salaam. Three new berths being built with funds loaned by the World Bank and Canada will probably be completed in 1975. The effect of this expansion may be largely negated by continued poor management of the port.⁴
- Increased East African port charges. Port charges for Zambian freight were increased markedly and unexpectedly in May 1974. Although Zambia subsequently negotiated substantial adjustments of these rates, the estimated annual rise in Zambia's overall cost is more than \$3 million, 15% of its shipping outlays.
- Uncertainty over rail traffic rates. They will be set only when the line is fully operational. Zambian shippers may choose other more economic routes if rates on the Tan-Zam Railroad are exorbitant, but there will be a strong pull to accept them because of the heavy government involvement in the economy.

18. Zambia has several routes for its trade which might become competitive if major changes occur in the political and security situation in Rhodesia and Angola.

4. A measure of port congestion at Dar es Salaam is highlighted by data showing that in February 1974 some 7,000 tons of Zambian cargo were awaiting shipment; in April, 24,000 tons; and by August, some 29,000 tons. By December, port congestion was reduced considerably, largely because of a decrease in traffic handled through the port. Increased traffic since then has caused conditions to deteriorate again.

- The railroad from the Zambian copper mines through Rhodesia to the Mozambique port of Beira -- If the elusive and difficult political settlement in Rhodesia can be achieved.
- The Benguela Railroad route through Angola to the port of Lobito -- If stabilization in Angola can be restored (something that may be a good distance in the future).
- The Tan-Zam Highway (the Great North Road) to the port of Dar es Salaam.
- The Great East Road from Zambia to Malawi, through to Mozambique, and then by rail to Beira (see Figure 1).

There are also important rail and road routes to the port of Nacala, Mozambique, or the port of Mombasa, Kenya.

19. The extension to the Benguela rail line in Angola, the Cubal variant, now completed, cuts travel time and doubles line capacity to approximately 6 million tons. The closure of the Benguela Railroad in August 1975 because of internal political disturbances has eliminated this route for the present. This development has severely aggravated Zambia's already serious transport difficulties since the Benguela railroad has been carrying one-half of Zambia's international traffic. Zambia currently ships a small amount of freight via Malawi and Mozambique, and, with the independence of Mozambique on 25 June, shipments over this route have become politically attractive to Zambia. Moreover, both Zaire and Malawi are planning new rail lines that will facilitate direct shipments from Zambia to the Atlantic coast port of Matadi or to the Indian Ocean port of Beira.

20. Upgrading and reconstruction of the 1,200-mile Tan-Zam Highway from Dar es Salaam to Kapiri Mposhi with IBRD and US assistance bear special mention. The project was accomplished in several stages

between 1966 and 1974. The completion of a petroleum pipeline in 1968, roughly paralleling the road network, also has relieved transport pressures between the two countries. The highway reduced Zambia's dependence on Rhodesia while the Tan-Zam Railroad was under construction. Now it provides additional benefit as a feeder system to the railroad.

The Tan-Zam Railroad and Economic Development

21. The construction of the Tan-Zam Railroad contributed an estimated \$23 million to Zambia's GDP annually and \$15 million to Tanzania's. Aside from the multiplier effect of this added employment, there was little indirect benefit to the two countries.

22. We believe that for 1976 the Tan-Zam Railroad will generate an operating surplus -- net income in excess of direct outlays for operations and management -- if operating costs can be controlled effectively. Given a rate structure comparable to existing routes and recent levels of shipment of commodities susceptible to rail carriage, a surplus of \$15 million should be produced in 1976. Overall, we estimate an annual operating surplus of approximately \$27 million by 1983⁵ when Zambia and Tanzania each must start to repay \$6.7 million per year for 30 years. The new railroad will thus be a sound financial investment for both countries and will pose no debt repayment problems.

23. The railroad is expected to spin-off other economic and social benefits. For Tanzania, it will provide access to untapped mineral resources and assist agricultural development in the western region (see Figure 2). In the Ketewaka-Mchuchuma area of the Southern Highlands,

5. The gross operating surplus postulates that freight revenues for the new line will be the same as freight charges payable for carrying the same tonnage on the Zaire Railroad. The estimated operating cost is based on operating costs for similar rail lines in Africa reduced about 10% because of consultant's estimates of low unit operating costs for maintenance of plant and equipment for the first 10 years of the line's operation.

exploitable coal reserves are now estimated at 350 million tons and iron ore reserves at 70-80 million tons. The proximity of the railroad has stimulated development of these reserves. China recently extended a \$75 million loan to enable Tanzania to exploit iron ore deposits at Chunya and coal deposits at Tukuyu. A feeder line from the deposit sites to the Tan-Zam Railroad, also financed under this Chinese credit, will allow these deposits to be marketed economically.

24. The railroad also will foster agricultural development in both the Kilombero Valley, a fertile region on the southeast fringe of the Southern Highlands, and other portions of the Southern Highlands. Cooperative self-supporting farming settlements, ujamaa villages, have been established in the area contiguous to the railroad to serve new markets. Several million Tanzanians have been resettled into ujamaa villages. The wheat, corn, and vegetables grown as well as cattle and sheep raised around these villages will provide both lower cost food for the domestic market and the prospect of increased agricultural exports.

25. The Tan-Zam Railroad will provide a major export transport option for Zambian shippers. The railroad also should boost indigenous economic development generally, especially in agriculture. Zambia now must import much of its food. The Tan-Zam Railroad will increase access to northern Zambia, where there is some opportunity to expand cattle raising, dairy farming, and production of coffee, tea, corn, and rice. This area has been earmarked for intensive agricultural development in the current national development plan (1972-76). Zambia intends to establish along the rail route Intensive Development Zones (IDZs) which will be transformed from traditional subsistence farming to small-scale, market-oriented commercial farming regions. Areas around Mpika and Kasama, for example, have been designated as IDZs; the area around Mkushi -- already with some commercial farming -- is another likely prospect. China recently extended a \$50 million credit to Zambia for rural development projects. Finally, Zambia may now start to exploit manganese and copper ore deposits near Mkushi which have not been developed because essential transportation facilities were lacking (see Figure 2).